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MODIFIED EIA AND INDICATORS OF SUSTAINABILITY: FIRST STEPS TOWARDS SUSTAINABILITY ANALYSIS

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ABSTRACT

This paper argues that the achievement of sustainable development requires, *inter alia*, the development of a framework of appropriate 'tools' to aid project, programme and policy development and implementation. Such a framework could usefully be called 'sustainability analysis'. It is likely to comprise a harmonised range of existing methodologies, some modified to address changing requirements (eg, modified EIA procedures to effectively include social, participatory and economic issues in order to address the key links between environmental impact and sustainable development), and some new elements (eg, indicators of sustainability). The need for sustainability analysis and particularly for indicators of sustainability is a key requirement to implement and monitor the development of national sustainable development plans, as required by Agenda 21 agreed at UNCED in June 1992.

1. EIA - A Tool in Need of Overhaul

Since its introduction in 1969 in the USA, Environmental Impact Assessment (EIA) has become widely used as a tool for project analysis. An increasing number of countries are introducing legislation which requires EIAs for certain categories of development. In line with this trend, bilateral and multilateral donors have introduced procedures, manuals and guidelines for the environmental assessment of projects.

In 1985, the OECD introduced recommendations for its members on the environmental assessment of development assistance projects and programmes, followed in 1986 by recommended measures to facilitate such EIAs.

Principles for project appraisal were developed in 1988 by the OECD Development Assistance Committee (DAC) and recommendations were agreed by the OECD Council in 1989 concerning an environmental checklist for high-level decision-makers in aid agencies. The essence of these various recommendations has been incorporated within the new DAC guidelines for "Good Practice for the EIA of Development Projects" (OECD, 1991).

The World Bank has also published recently a very useful three-volume Environmental Assessment Sourcebook (World Bank, 1991).

However, despite the increasing adoption and formalisation of EIA procedures internationally, EIA is still seen by many principally as a technical instrument, and it is wrongly assumed by some to be useful only for application at a relatively advanced stage in the project cycle, or as a disaster- or crisis-management tool.

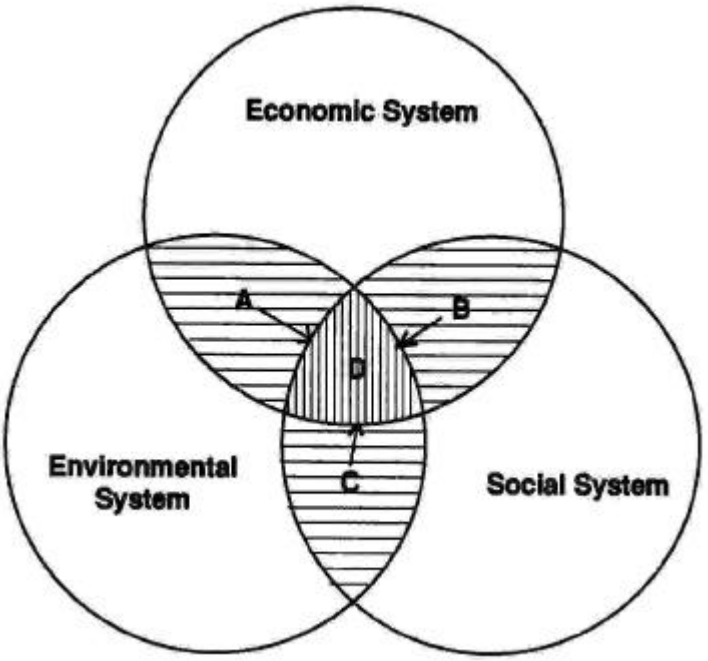
This is unfortunate because the potential of EIA is really as an 'attitude' and as a process which can be applied to all projects and programmes throughout their development and implementation and, with modification or adaptation, to policies.

EIA has suffered a bad image amongst many of those involved in promoting sustainable development. This is because the tool has been used inappropriately or on limited components of the sustainable development system (see Figure 1). Those who have employed EIA have rarely integrated successfully environmental, social and economic issues - the three most vital components of the

equation. In Figure 1, sustainable development takes place within the central interactive zone (shaded) between the economic, the environmental/biological and the social/cultural systems. It is subject to a continual process of trade-offs between these systems. Intuitively, it is evident that development cannot be sustainable if one of these systems is not incorporated.

In the main, current EIA practice identifies and estimates the environmental impacts of development projects in physical terms. Techniques of social cost-benefit analysis (SCBA) are sometimes included in an EIA to widen its terms of reference. These are aimed at assessing the costs and benefits (including

Figure 1: The Sustainable Development System



INTERFACE	EXAMPLES OF ANALYTICAL TOOL	EXAMPLES OF PLANNING PROCESSES
A	Traditional EIA	National Conservation Strategies Sectoral Natural Resource Strategies
B	Social Cost Benefit Analysis	Traditional Development Plans
C	Some Human Ecology & Anthropology Studies	UNESCO Man and the Biosphere Programme
D	Sustainability Analysis (modified EIA)	National Sustainable Development Plans/Strategies

Note: This diagram is illustrative only and is not intended to imply that all EIA and SCBA studies are narrowly focussed. Whilst current EIA approaches are focussed primarily at the interface between the environmental and economic systems (eg, the impact of enterprises on habitat), it is recognised that other forms of EIA have incorporated some social dimensions.

environmental impacts) in monetary terms as far as possible, and in qualitative terms where this is not possible. But SCBA techniques have largely been developed independently of EIA, although the demarcation lines between them are often blurred. As Lee (1991) points out, "some SCBA studies have to ignore environmental impacts or express them in physical units, where monetary measures are unavailable", whilst some EIA studies include "employment and other socio-economic impacts Alongside the environmental impacts". Whilst SCBA has been used as a valid tool for assessing the social and economic 'worth' of project or policies, the quantification of the costs and benefits of environmental impacts is often (some might say usually) not undertaken, mainly due to the insufficiency of required data and to continuing controversy over some of the techniques available.

However, it is not always easy to compare environmental, social and economic impacts. Lee (1991) quite correctly asks, "how should the overall environmental impact of development be evaluated - or how can the aggregate environmental impact be compared with the economic and social impacts when reaching a decision on a project ?". It is argued by some that the task is greatly simplified by expressing environmental impacts in monetary terms whilst others find monetary valuation unacceptable and argue that other means are required.

The prominence that this debate has now achieved arises due to several factors, including recent advances in the methodology of monetary valuation (e.g., OECD, 1989; Pearce et.al.,1989; Winpenny, 1991) and official encouragement for the use of monetary valuation (World Bank, 1991; Department of the Environment, 1991).

Admittedly, EIAs carried out in the last few years - what we might call 'new generation' EIAs - are giving more attention to social issues. But, whilst public consultation is now a recognised norm in full EIAs, EIAs are rarely conducted in a truly participatory way, and project beneficiaries are seldom involved adequately in the process. Although EIAs are being extended to include measures of the damage costs associated with adverse environmental impacts, comprehensive monetary valuation and economic analysis of environmental costs and benefits are seldom included (Barbier, et.al., 1991).

There is, however, a widening recognition of the urgent need to modify EIA approaches, to place greater emphasis on its practical application, and to address the links between EIA and sustainable development. It has to recognised, however, that EIA alone cannot make development sustainable although "it can help push decision- makers along the path towards sustainability" (Clarke, 1991). EIA will be an important tool in the 'kit bag' required to back up the development of national sustainable development plans.

2. National Sustainable Development Plans

One of the main outcomes of UNCED was ratification of Agenda 21 which set priorities for achieving sustainable development. Real action, particularly in the context of international conventions and the priorities contained in agenda 21, takes place at the local and national level. This is where there is knowledge, concern, involvement and the capacity to act. This is where the focus of strategic planning processes should lie. It is a major encouragement, therefore, that Agenda 21 rightly recommends that translation of its priorities for action be focussed at the national level through sustainable development plans.

Planning for sustainable development at the national level is nothing new, of course. There are many different approaches, many of which are advocated by different aid agencies in different contexts (see Box 1).

Box 1: Some examples of national planning approaches

- National Conservation Strategies, led by IUCN;
- National Environmental Action Plans, led by the World Bank;
- National Tropical Forest Action Plans, led by FAO;
- National Plans to Combat Desertification, led by UNEP/UNSO;
- National Energy Assessments, led by the World Bank;
- Economic-cum-environmental development planning, led by the Asian Development Bank;
- A variety of environmental strategies and country environment profiles prepared by bilateral aid donors; and
- The UNCED national reports on sustainable development.

To this list may shortly be added the "national plans" that will arise out of the international climate and biodiversity

It can be assumed that the proponents of each of the various approaches listed in Box 2 will be promoting them vigorously as 'the way' towards sustainable development planning. Some of the initiatives listed have enjoyed considerable success. A number of them aim to deal with the wide range of issues implicit in the concept of sustainable development. But again, it needs to be recognised that most are weak on environmental economics and whilst they usually purport to be participatory and country-oriented, they tend, in fact, to be driven largely by outside agencies (Sandbrook et.al.,1992). Many of the approaches overlap in subject and geographical scope, and some have been duplicated in the same country.

An analysis of the documents on any one country arising from these national initiatives indicates that they have used essentially the same data, but rarely have the results of any public consultations been included. Their preparation usually involves foreign consultants talking to the same people in the governments who, in turn, have to meet conflicting demands (by aid donors). On occasion, there is also an element of 'green conditionality' involved, as the preparation of a plan or a strategy document is linked to the release of aid funds.

There will be much to learn from an analysis of the successes and failures of aspects of all of these approaches, and such a review would greatly assist the further consolidation of efforts towards national and sub-national processes for sustainable development.

3. Tools for National Processes

To ensure the promotion, implementation and monitoring of national processes leading to the development of national sustainable development plans will require the harnessing, further development and packaging of appropriate 'tools' which can aid project and programme development, and assist the setting of policy frameworks. Some examples of the tools which are likely to be important are listed in Box 3.

It has to be acknowledged, however, that these are wide ranging and it is, as yet, far from clear how readily they can be integrated. But the harmonising of appropriate tools, with modification where required, into a framework or suite (which we could usefully term ***sustainability analysis***) is fundamental to operationalising sustainable development.

As a framework, sustainability analysis should be applicable across the spectrum from the project to the policy level. But different techniques or combinations of techniques are likely to be appropriate according to the level involved and the question at hand. For example, whilst resource accounting and

social cost benefit analysis (SCBA) have each been applied at both the policy and project level, the former is less appropriate at the project than the policy level, whilst SCBA is more appropriate at the project level.

The focus for sustainability analysis is to develop the menu of tools (integrated where possible) that can be applied, as appropriate, for particular problems. The integration of tools will not be straightforward. In some cases, integration may be more successful between tools applicable at a given level rather than across levels. An important challenge is to investigate how project level analysis can feed into policy analysis.

Many of the tools listed in Box 2 have been used widely at the project level. They have been applied less at the programme level and only a few of them (notably techniques of environmental economics) for policy analysis. Moreover, they have often been applied independently of each other by specialists whose experience and work regime seldom overlaps. Furthermore, some have also been misapplied - as the wrong tool or combination of tools for particular jobs or for producing policy-relevant results.

It will be important to set the boundary conditions for sustainability analysis. Initially, a wide range of tools and options will need to be considered, but it will be necessary to provide a focussed approach that can be of practical value to those needing to apply the techniques.

In considering sustainability, issues of reversibility need to be taken into account. A sustainable project may become unsustainable as a result of an intervention or impact, but through mitigatory action can be made sustainable again. It also needs to be recognised that 'sustainability' cannot be represented by a level line on a graph. Sustainability is a dynamic phenomenon and will fluctuate. An important objective will be to set acceptable limits for fluctuation.

Box 2: Some tools for project and programme development and for policy framework setting

- Environmental assessment
- Indicators of sustainability
- Social impact assessment
- Participatory rural appraisal & monitoring
- Techniques of environmental economics (e.g. social cost-benefit analysis, economic policy analysis, resource accounting
- Agro-ecosystem analysis
- Land evaluation techniques
- Integrated resource management
- Ecosystem analysis (eg, agro-ecosystem analysis, marine ecosystem analysis)
- Ecological/physical monitoring

For each tool, there will be a need to consider:

- Its appropriate use
- The appropriate user
- The institutional framework required (including the decision-making framework)
- The implications of using the tool
- How successful it has been in practice
- What research is needed for tool development
- What other tool(s) it combines well with

4. Modified EIA - a Tool Reforged

A strong case can now be made to modify existing EIA practices to draw effectively from methodologies of social impact assessment, participatory appraisal procedures and environmental economics.

There is already a clear indication that many environmental advisers working in bilateral and multilateral development agencies would support such a modified approach. But the quantum leap required to move from conventional EIA to a wider and more comprehensive approach encompassing genuinely the environmental/biological, social and economic aspects on an equal basis - as envisaged by sustainability analysis, could not be achieved in a short time frame. The development and testing of a practical and usable suite of harmonised methodologies would take time. Therefore, we should consider modified EIA procedures as a practical incremental approach.

Modified EIA procedures might best be developed on a sectoral basis at first, focusing on selected key problems with significant social and economic dimensions as well as environmental implications. IIED, for example, is now pursuing this approach in a research programme focussing on modified EIA for hydropower dams, irrigation schemes, refugees and displaced peoples.

It is suggested that such an issue based strategy will facilitate an iterative approach, building on lessons learned, and will provide a means to test and demonstrate the utility of a modified approach to EIA. This will enable the incremental approach towards developing a full framework for **sustainability analysis**. In due course, sectoral guidelines for modified EIA will need to be considered by donor agencies and governments.

5. Indicators of Sustainable Development

It is well recognised that environmental indicators are vitally needed to capture trends in ways that policy makers and others can grasp immediately. As Mathews and Tunstall (1991) have pointed out, " economic planning would be unthinkable without GNP figures, unemployment rates, and the like; so would social planning without such indicators as life expectancy and rates of fertility, infant mortality and literacy. Yet, environmental policymaking has no comparable measures today". New indicators are needed to guide policymakers in their assessment of environmental quality and to enable the integration of environmental, economic and social concerns for sustainable development planning. Such indicators will be a vital ingredient in the development and monitoring of national sustainable development plans. They will also be a key tool in sustainable analysis.

There have been some suggestions of indicators of sustainability for individual sector or ecosystems (eg, ITTO, 1991), and others have suggested indicators for sustainable development in general (e.g., Mathews & Tunstall, 1991 - Table 1; Holmberg, et.al., 1991, Table 2). But these are still far from satisfactory.

However, it will be extremely important to avoid focussing on indicators that are difficult or impossible to measure in developing countries. Simple and practical indices are required.

Those suggested in Table 1 provide a useful starting point. They are less post-hoc than the quantitative indicators listed in Table 2, focussing on Clarke's (1991) 'path towards sustainability'. They provide qualitative and 'barometric' measures which encompass practical and legitimate targets, i.e. they give a flavour of what sustainable development would look like. In this regard, they are more easily monitored than the 'harder' indicators of Table 2 and are more condusive to participatory monitoring by citizens groups.

GDP is perhaps the most used 'hard' measure of development, but it fails to allow for capital maintenance of natural assets and takes limited account of the contribution of the environment to economic activity. As a consequence, this measure might actually discourage the implementation of sustainable development policies, particularly in countries with an economy which is heavily dependent on the use of natural resources.

Holmberg (1991) has suggested a typology of the indicators that might be considered:

- **Environmental indicators** - measuring changes in the state of the environment. These indicators should be simple and practical, easily read and understood by decision makers, and might best be expressed in non-monetized, physical terms, placing an emphasis on rates of change (e.g., rates of depletion of fish stocks or forest resources). They should be based on data that is readily Available in common data sources.

- **Sustainability indicators** - measuring the distance between that change and a sustainable state of the environment;

- **Sustainable development indicators** - measuring progress towards the broader goal of sustainable development in the national context.

The development of these indicators will require careful consideration of a number of methodological issues related to qualitative variables, such as the performance of institutions.

In terms of this typology, the indictors listed in Box 3 are clearly sustainable development indicators whilst those in Table 1 are actually a mixture of environmental and economic indicators.

Some people would argue that the bureaucratic mode of many donors and governments could not cope with a multiplicity of separate environmental indicators and that a single or 'collapsed' indicator would

Table 1: A few indicators of sustainable development

Many of the following indicators avoid the need for a long time series of data, or of having to define sustainability quantitatively, by merely asking if things are getting better or worse. As such, they are suitable for participatory methods of monitoring (10.3.3).

THE USE OF ENERGY AND MATERIAL

- Per capita resources consumption, for a given standard of living, is dropping;
- The proportion of non-renewable energy usage in primary production is diminishing, while renewable sources, such as solar or human energy, are increasing: and sectors using non-renewable forms of energy are investing significantly to develop and apply technologies that will use renewable forms;
- Passenger kilometres travelled by public transport are increasing in proportion to those travelled by private motorized transport;
- There is a progressive increase in both official incentives to use renewable energy and disincentives to use non-renewable forms;
- There is an increasingly free flow of technology, especially to poor countries.

ECOLOGICAL PROCESSES & BIOLOGICAL WEALTH

- Development activities seek to maintain ecological processes (soil fertility, waste assimilation, and water and nutrient cycling) and not to exceed the capacity of these processes;
- Development increasingly depends upon and conserves a growing range of genetic material, not only the different species but the varieties within species;
- Renewable resources are increasingly used and harvested at rates within their capacity for renewal;
- More and more areas of high value for their irreplaceable environmental services are not only being set aside, but are being effectively managed, with secure funding.

POLICY, ECONOMICS & INSTITUTIONS

- Economies - especially those that depend upon high-volume natural resources data - are diversifying, especially towards high-value information and service industries;
- There are growing numbers of formal mechanisms to integrate environmental and development concerns, and to insert environmental values in prevailing systems of economic policy, planning and accounting;
- More accurate and representative economic indicators are being introduced to measure sustainable development, so that the currently dominant concerns of consumption, savings, investment and government expenditures are increasingly joined by measures of natural resource productivity and scarcity;
- More methods are being introduced for valuing use by future generations, for comparing such use to today's needs and for making equitable trade-offs between generations;
- Flows of resources to and from a given country are increasingly stable and equitable, and do not result in severe net depletion of the national resource base;
- Both the incidence and the effects of "boom and bust" are diminishing;
- There are both regulatory measures that ensure that resource limits are not exceeded, and enabling measures that encourage voluntary improvements in technology to make more sustainable use of resources within those limits;
- Environmental monitoring is regularly and effectively carried out, and both policies and operations are adjusted to suit;
- Military budgets are decreasing in relation to budgets for work to ensure environmental security and sustainable development.

SOCIETY & CULTURE

The notion of resource limits, and the need for sustainability in production and livelihood systems, is increasingly prevalent in a society's values, embodied in its constitutions and inherent in its education systems

- The community is becoming more diverse in terms of skills and enterprises, and yet remains coherent as a community;
- There is a growing body of commonly held knowledge and available technology for maintaining a good quality of life through sustainable activities;
- There is a tendency towards full employment, good job security and household stability;
- Increasing numbers of people have access to land adequate for sustaining good nutrition and shelter for their families and/or adequate, reliable incomes to pay for these necessities;
- The costs and benefits of resource use and environmental conservation are more equitably distributed: consumers increasingly choose to pay for goods and services that are resource-efficient and minimize environmental degradation;
- Conflicts over land and resource rights are diminishing;
- People who once relied upon unsustainable activities for their livelihood are being supported in their transition to sustainable activities;
- Development is increasing people's control over their lives, the range of choices open to them and the knowledge to make the right choices: it is compatible with the culture and values of the people affected by it, and contributes to community identity.

Source: Holmberg *et.al.* (1991)

be preferable. It has to be admitted that this argument has some logic, particularly given that much data is of poor quality, that individual indicators provide a limited impression of the overall environmental situation in a particular country, and that not all indicators will apply to all countries (for example, all countries will have a literacy rate and a GDP, but not all will have a rate of deforestation).

Daly and Cobb (1989) have suggested an index of sustainable economic welfare which includes environmental components but is much broader. This index might usefully be refined with time, using the above typology, into an index of sustainable development.

The relative merits of a range of separate indicators and single indices will need very careful consideration. But the key guide in our framing of operational recommendations for sustainable development must be simplicity.

Table 2: some environmental and economic indicators of development

Countries	1985-90 Population Growth Rate (%)	1985-89 GNP Growth Rate (%)	1991 Human Development Index [a]	1989 Energy Consumption [b] (gigajoules per capita)	1988 Carbon Emissions [c] (metric tons per capita)	Mid-1980s Production of Hazardous Wastes [d] (metric tons)	Annual Rate of Deforestation [e] (hectares)	1989 Protected Areas (% of country)	1990 Water Use (% of available supply)	Soil Erosion (metric tons per hectare per year)
Algeria	3.12	1.7	0.490	27	0.7	X	40,000 [f]	0.2	16	X
Botswana	3.51	11.4	0.524	X	0.4	X	20,000 [f]	17.7	1	X
Brazil	2.07	3.9	0.759	23	0.4	X	1,380,000	2.4	1	X
China	1.39	7.9	0.614	24	0.6	X	X	0.8	16	X
Costa Rica	2.64	4.6	0.876	15	0.2	X	42,000	12.0	1	X
France	0.36	3.2	0.971	116	1.6	2,000,000	X	8.2	18	X
Haiti	1.88	(0.6)	0.296	2	0.0	X	2,000	0.3	0	X
India	2.08	5.8	0.308	8	0.2	36,000,000	48,000 [f]	4.4	18	75 [g]
Jamaica	1.52	5.3	0.761	25	0.6	X	2,000	0.0	4	36 [h]
Mexico	2.20	0.9	0.838	49	1.0	X	595,000	2.9	15	X
Nigeria	3.43	2.9	0.242	6	0.1	X	300,000	1.1	1	14 [g]
Peru	2.51	(0.2)	0.644	15	0.3	X	270,000	4.3	15	15
Rwanda	3.40	(0.4)	0.213	1	0.0	X	3,000	10.5	2	X
Sau. Arabia	3.96	1.5	0.697	186	3.5	X	X	0.4	106	X
Sier. Leone	2.49	2.3	0.048	2	0.0	X	6,000	1.4	0	X
Spain	0.38	5.3	0.951	73	1.3	1,700,000	X	5.1	24	X
Sweden	(0.03)	2.4	0.982	149	1.8	500,000	X	4.1	2	X
Thailand	1.53	10.2	0.713	19	0.3	X	158,000	9.1	18	X
USA	0.82	3.3	0.976	297	5.3	265,000,000	159,000 [f]	8.6	19	10 [h]
Zimbabwe	3.15	3.6	0.413	20	0.5	X	X	7.1	5	50 [g]

Source: Mathews & Tunstall (1991) using data from the United Nations, World Bank, World Conservation Monitoring Centre, World Resources Institute

Notes

X = Not available. O = Zero or less than half the unit of measure. [a] The Human Development Index, constructed by the UNDP, combines, in one number, a measure of economic, educational, and health deprivation. Countries above 0.8 are considered to have high human development; 0.5 to 0.8, medium development; and below 0.5, low development. [b] Energy consumption includes traditional fuels.

[c] Figures include carbon from energy consumption and other industrialized sources.

[d] Hazardous wastes are not defined consistently from country to country. [e] All figures are from the Food and Agricultural Organisation of the United Nations for the 1980s, except the following countries, which come from national sources for the years indicated: Brazil, 1990 (legal Amazon only); Costa Rica, 1973-89; India, 1983-87; and Thailand, 1985-88. [f] These figures include open and closed forests; all others are for closed forests only. [g] Figures are for seriously

affected cropland only.
[h] Figures are for total cropland.

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